

Annual Report

Last copy

**FOREST PEST CONDITIONS
IN
WISCONSIN**

1957

**WISCONSIN CONSERVATION DEPARTMENT
FOREST MANAGEMENT DIVISION
FOREST PESTS — SURVEY AND CONTROL**

FOREST PEST CONDITIONS IN WISCONSIN 1957

Forest pests seriously reduce the potential of Wisconsin's forests but efforts to reduce these losses to a minimum are being continued. Progress in the fight against losses by insects and disease is being made. Each year's experience adds to our fund of knowledge which in time will permit us to obtain the maximum return from our timber stands.

Wisconsin's forested areas are not used for timber production alone. Many other factors such as watershed protection, fish game, and recreational values must be considered in a pest control program. After careful study of all the aspects of a forest pest problem, a control program is followed that will protect the highest values at stake with the least hazard to other factors involved.

Highlights of the year's forest pest activity

Insects requiring major control efforts during the year were the jack pine budworm and the saratoga spittlebug. The budworm was epidemic in a five county area in the Northwest Area and in one county in the Northeast Area. In other parts of the state budworm populations were endemic.

Most of the spraying for control of the spittlebug was done in the Northeast Area. Small acreages were sprayed in Marathon and Douglas Counties.

Reports of root collar weevil damage were more numerous than in past years. This pest is a serious plantation problem in sandy soil areas.

The forest tent caterpillar was very active again in parts of northern Wisconsin. Surveys indicate high populations will be present in some counties in 1958.

Hard maples in Marathon and Florence Counties are afflicted with a blight of unknown cause. State and federal agencies, cooperating with private industry, are planning the attack on this important problem for 1958.

A total of 61 kinds of insects and 11 diseases were reported from the five pest control areas. Detailed information on the major pests is found in another section of this report.

COOPERATIVE INSECT SURVEYS

The Forest Pest Control Section of the Conservation Department has been cooperating with the Division of Plant Industry of the Wisconsin Department of Agriculture for the past few years in gathering information on pest conditions in the state. During the pest season, weekly reports of forest pests from observers in the field are sent to the Department of Agriculture which compiles a weekly bulletin on insect and disease activity within the state. This information is also forwarded to the Plant Pest Control Division of the Agriculture Research Service of the U. S. Department of Agriculture where it is published in the weekly Cooperative Economic Insect Survey Report which has nation-wide circulation.

Pest survey information is also exchanged with the Lake States Forest Experiment Station of the U. S. Forest Service where it is combined with information from other Lake States to give a comprehensive picture of forest pest conditions in the region.

AIRPLANES IN SURVEY WORK

The forested acreage under the jurisdiction of each area entomologist is tremendous. Even with the aid of the expanding pest observer force it is difficult to visit many areas even once during a season, consequently there is always the danger that a potentially serious problem may not be detected early enough to prevent damage.

Airplanes have proved to be useful tools in surveying forest insect and disease infestations. Acreage that would require weeks or months of work on the ground can be checked for defoliation damages or mortality in a few hours flying time. Trouble spots can be pin-pointed on a map and then easily found by ground checking crews when necessary. An area can be covered several times during a season to follow the development or progress of an outbreak whereas, on the ground it might be possible to get into such an area only once during a season.

Remote infestations which might otherwise escape detection can be located and their progress followed.

AMENDMENT OF FOREST PEST CONTROL ACT

The section of the pest control act relating to the distribution and collection of costs incurred by the state in controlling forest insect pests and diseases, 26.30 (9) (a) was amended to read as follows :

(9) Distribution and collection of costs. (a) At the completion of the control measures in any area, or at the end of the calendar year, the commission shall prepare a certified statement of the expenses incurred in carrying out such measures including expenses of owners covered by agreements pursuant to sub. (8) but these charges shall not include salary or expenses of regular permanent or seasonal personnel of the commission, or operating costs for such regular equipment as may be owned or purchased by the commission for insect pest control work. The statement shall show the amount which the commission determines to be the state's share of the expenses, but this amount shall not be less than 50 per cent of the balance of such expenses incurred on forest lands after federal funds allocated to a specific control project have been deducted. The share of the state may include any federal aid funds and the value of contributions made available by other co-operators* * *. The balance of such costs shall constitute a charge on an acreage basis against the owners of lands in the area affected by the forest pest for which control measures were conducted. In fixing the rates at which charges shall be made against each owner, the commission shall consider present values and the present and potential benefits to such owner and to the state as a whole from the application of control measures, the cost of applying such measures to his land, and other such factors as in the discretion of the commission will enable it to determine an equitable distribution of the costs to all such owners. No charge shall be made against owners to the extent that they have individually or collectively contributed funds, supplies or services pursuant to agreement, and 160 acres or less of forest land owned by any person within any county shall be exempt from a any control cost.

The revision reduces the cost burden on the state where federal aid funds are used on a control project.

Wisconsin Dutch Elm Disease Control Program

Dutch elm disease has become a threat to the elms in many Wisconsin cities. The need for a coordinated effort to combat the disease led to the formation of a Dutch elm disease subcommittee on October 2, 1956. This subcommittee consists of one representative each from the University of Wisconsin Departments of Entomology and Plant Pathology, Agricultural Extension Service, League of Wisconsin Municipalities, Wisconsin Conservation Department and the Wisconsin Department of Agriculture.

After a thorough review of the control program, the subcommittee prepared a proposed program listing the activities that would be handled by each agency as the work develops. The role of the Conservation Department in the program is as follows :

- (1) Provide assistance in conducting annual surveys for the insect vectors and diseased trees through the use of the pest observer force which is distributed over the state.
- (2) Assist in training of crews of municipalities, towns and counties for the detection of symptoms and collecting and submitting suitable specimens for laboratory diagnosis.
- (3) Assist in conducting Dutch elm disease meetings in communities.
- (4) Recommend woodlot sanitation through the foresters in their contacts with owners who have appreciable numbers of elms on their properties particularly properties near communities or other areas where high value trees would be menaced.

MEETINGS AND CONFERENCES ATTENDED

A number of meetings were attended by members of the pest control section. Some of the more important ones are briefly reviewed in the following paragraphs.

The annual Lake States Forest Insect Survey meeting was held at Milwaukee in February. Sampling techniques for forest insect surveys were discussed and survey plans for white pine weevil, European pine shoot moth, jack pine budworm, and other insects were considered.

Plans for the proposed jack pine budworm control program for 1957 were presented at the North Central States Branch meeting of the Entomological Society of America at Des Moines, Iowa in March.

Spruce budworm aerial and ground survey techniques were discussed at a meeting at the Lake States Forest Experiment Station laboratory near Ely in July. An aerial tour was made of part of the infested area and the use of aerial survey equipment was demonstrated.

The maple blight situation in Florence County caused increasing concern to timber owners in that area as the season progressed. In August a meeting was held at Wisconsin Rapids to discuss plans for handling the problem. This meeting was attended by representatives of the Conservation Department, the University of Wisconsin Department of Plant Pathology, the U. S. Forest Service, and industry.

MEETINGS AND CONFERENCES (continued)

On October 17 the director of the Lake States Forest Experiment Station called a conference at Wausau to review proposals for activities relating to the maple blight situation in 1958. The meeting was attended by 23 technical personnel from various agencies including the Conservation Department, the University of Wisconsin, the University of Michigan, the University of Minnesota, Michigan College of Mining and Technology, the U. S. Forest Service, and industry. The current status of the problem, reports on research and survey work already underway and needs for future research and surveys were discussed.

The problem was reviewed at several other meetings, including one with the Northern Hemlock and Hardwood Association at Land O'Lakes. As a result of the above meetings and others that were held, a coordinated program is being developed which will attempt to determine the cause of the trouble and to remedy the situation as soon as possible.

Diseases and insects of jack pine were the main topics of discussion at the sixth annual Central International Forest Insects and Disease Conference held at Winnipeg, Manitoba from October 9 to 11. A field trip to the Whiteshell Forest included visits to timber stands affected by jack pine budworm and spruce budworm. Larch sawfly plots were visited to observe studies being conducted and a tour was made of the field station.

The number of meetings of the Forest Pest Steering Committee in 1956 was reduced because of preparations being made for the jack pine budworm control program. A joint meeting of this committee and the Forestry Advisory Committee was held in June at Spooner while spraying operations were underway. The operations were explained and members of the committees observed equipment being used in the field.

PERSONNEL NOTES

The total work force of the pest control section remained the same as in 1956. One new man was added to the staff during the year and another resigned to attend school and work for the U. S. Forest Service. The office at Wisconsin Rapids was closed. Area entomologists are presently stationed at Spooner, Antigo, Oshkosh, and Nevin Hatchery near Madison.

PLANS FOR NEW PEST CONTROL BUILDING

Plans are being developed for a new pest control center to be built at Nevin Hatchery in Madison. The building will accommodate the supervisor of forest pest control, the Southern Area entomologist, and the forest inventory computing section. Office and laboratory space for working with insect and disease specimens, a small soil testing laboratory, an insectary, and some greenhouse space are included in the plans. Specimens from observers throughout the state will be routed through the area entomologist's office to the laboratory for processing. At the present time this work has to be done under very unfavorable conditions since adequate laboratory space is not available.

EDUCATION - EXHIBITS - IN-SERVICE TRAINING

Area entomologists participated in the Conservation Day Program at high schools in the northern part of the state.

The forest pest control program and a discussion on forest entomology were presented at a school for conservation aids in March of 1957.

Two radio tapes were made concerning the jack pine budworm spray project and one pest control T. V. program was kinescoped.

The Forest Pest Control Section prepared an exhibit which was part of the display set up by the Forest Management Division at the State Fair in Milwaukee. An airplane of the type commonly used in forest pest control work was one of the main attractions of the exhibit (Courtesy of Aerial Blight Control, Inc.) Other equipment used in forest pest control and specimens of insects and their damage were displayed.

The fifth annual training program for pest observers was postponed because of preparations for the budworm control program.

DIRECT CONTROL OPERATIONS

Jack Pine Budworm Control Program

The winter and spring of 1957 were spent preparing to spray as much as 195,000 acres of jack pine forest to control the jack pine budworm in the Northwest Area and in Oneida County in the Northeast Area. Federal aid was enlisted to help finance what apparently was going to be a major chemical control operation. State Emergency Board approval was received to spend as much as \$412,000 if necessary to carry out the program and the state was to be reimbursed from federal funds for 25% of the amount spent on the control job.

Consultations with department foresters concerning timber values involved and budworm information from more than 300 survey plots were the basis for revising downward the figures for acreage needing treatment. At the time the operation started plans were to spray a minimum of 57,510 acres and a possible maximum of 171,400 acres.

Fish Management and Game Division personnel were kept informed of developments in the program study. Areas within the contemplated spray blocks were established to observe the immediate and long range effects of spraying on fish and game habitats and the wild life in them.

Public meetings were held in each of the counties where spraying was impending to acquaint the public with the proposed plan of action. Attendance at the meetings was small and no opposition to the program was encountered. Zones of infestation were then established by the Conservation Commission.

The contract for spraying was let to a private contractor at a price of \$1.24 per acre which included the insecticide, its loading and application. DDT was to be applied at the rate of one pound in one gallon of oil spray mixture per acre.

Spraying operations began on June 19 in Polk County. It soon became apparent that biological control factors were reducing the number of budworms in many areas to the point where chemical control measures would not be necessary. Evaluation crews re-examined blocks of trees that had been scheduled for treatment and a large acreage was eliminated from the control program. The final acreage sprayed in the Northwest Area was 18,770 and in the Northeast Area (Oneida County) 7,400 acres were treated. Operations were concluded on June 25 in Bayfield County and on June 24 in Oneida County. The information and experience gained in 1956 and preceeding years plus the close cooperation of university entomologists and others in the evaluation crews eliminated much needless spraying at a considerable saving of state and federal funds.

Manpower needs for the job were filled by several cooperating agencies including a number of divisions within the Conservation Department, the University of Wisconsin College of Agriculture, the University of Minnesota, U. S. Forest Service, and private industries. The wholehearted participation by the various agencies was an excellent example of the help that is available when a major pest control problem arises in the state.

Budworm control (cont.)

Two types of airplanes were used in the Northwest Area. Seven Stearmans and three converted navy torpedo bombers (TBM's) were on hand when spraying operations started. Although the TBM's were able to cover area more rapidly than the smaller planes, they required more maintenance work and it was concluded that Stearmans were more suitable for the job. The smaller planes were used exclusively in the Northeast Area. An observation plane was in the air at all times when the spray planes were working. The observer was in radio contact with ground crews in the field and at the airports thus permitting strict control of the operation.

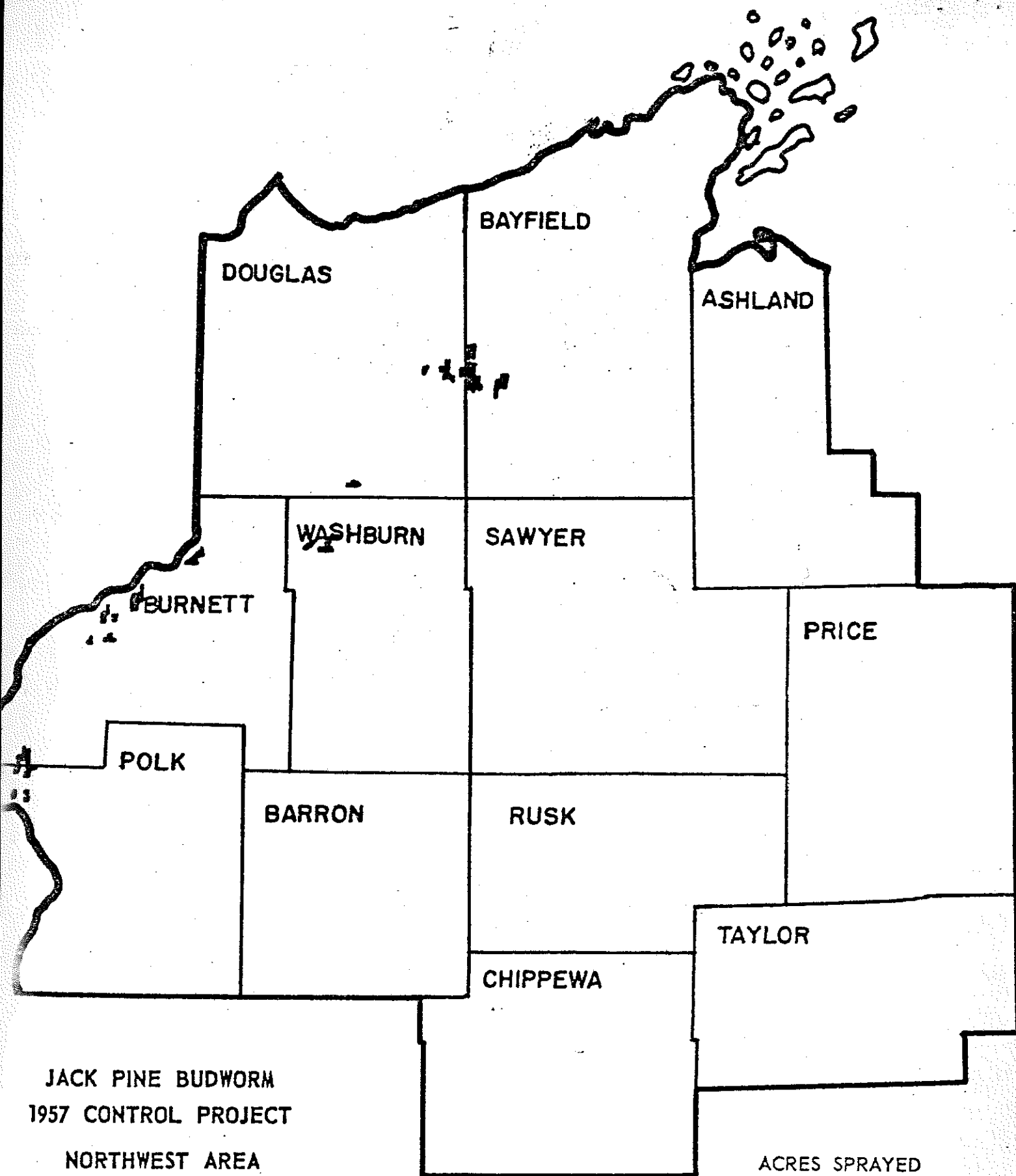
Results in the sprayed areas were satisfactory despite adverse weather conditions. Biological control factors supplemented by the spraying were an effective combination in bringing about the decline of the epidemic.

No significant detrimental effects on fish or wildlife were reported by observers. Five ducklings, some minnows, and small aquatic forms such as insects and frogs were reported killed in potholes and other waters sprayed inadvertently because they could not be seen in time to be avoided.

Following is a list of counties and the jack pine acreage sprayed in each :

<u>County</u>	<u>Acres Sprayed</u>
Burnett	6,645
Washburn	1,840
Douglas	2,895
Bayfield	3,100
Polk	4,290
Total	18,770
Oneida	<u>7,400</u>
Grand Total	26,170 acres

Total expenditures by the state for the project amounted to \$ 69,277.34. Reimbursement from federal funds totalled \$ 17,319.34 and the balance was borne by the state and private owners.



■ Approximate Areas Sprayed

Bayfield	County	3400
Burnett	County	6645
Douglas	County	2895
Polk	County	4290
Washburn	County	1840

Saratoga spittlebug control project

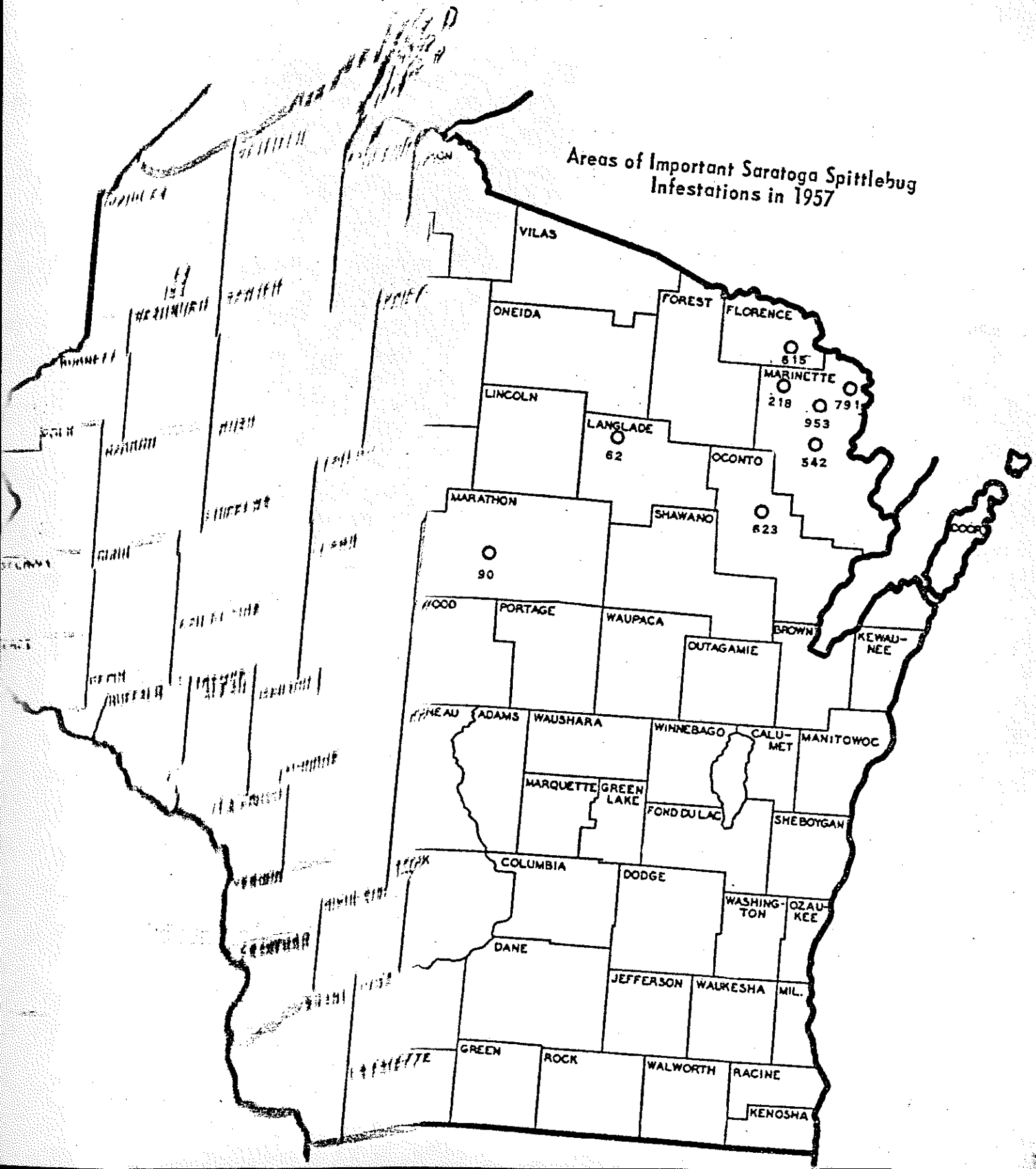
It was necessary to spray 4,032 acres for spittlebug control in 6 counties during 1957 in contrast to the 351 acres of red pine plantations sprayed in one county in 1956. An aerial spraying company contracted to supply the insecticide and do the flying for \$2.30 per acre. Department entomologists rendered technical help and other department, county and industry personnel assisted in carrying out the spray project.

DDT was applied at the rate of 1 pound in one gallon of oil solution per acre. A small portable radio temporarily mounted in the airplane cockpit permitted air to ground contact and increased the efficiency of the plane. The pilot was guided from one place to another when several small plantations were sprayed in a vicinity and thus it was not necessary for him to land for instructions with a partial load of insecticide. Spraying operations were begun in Oconto County on July 19 and completed in Douglas County on July 24. Post-spray surveys indicated that the control work was very effective.

The acreage treated and the cost of the aerial application in each county is shown in the following table :

County	Total Acreage Sprayed	Acreage Sprayed free of cost to County	Costs Shared Equally	Cost to State (first 160 A or part thereof + half of cost on remaining acreage)	Cost to Owner	Total Cost of Spraying
Marinette	2,489	160	2,329	\$3,046.35	\$2,678.35	\$5,724.70
Oconto	623	160	463	900.45	532.45	1,432.90
Florence	615	160	455	891.25	523.25	1,414.50
Marathon	90	90		207.00		207.00
Langlade	62	62		142.60		142.60
Douglas	153	153		351.90		351.90
	4,032	785	3,247	\$5,539.55	\$3,734.05	\$9,273.60

Areas of Important Saratoga Spittlebug Infestations in 1957



White Grub Control

A number of tree planters were in use during the 1957 planting season with chemical applicators mounted on them. They were used principally in the Northeast and East Central Areas. Many pine seedlings were lost in the Northwest Area where such equipment was not used and some losses occurred in the Southern Area also. Reports were not received from the West Central Area. Aldrin in solutions ranging from 1/2% to 2% was applied with most of the planters. Some dieldrin was also used.

Acreage on which trees were treated at planting time were reported from the following counties :

<u>Northeast Area</u>	<u>Acreage</u>
Florence	30
Langlade	40
Lincoln	45
Marathon	300
Marinette	260
Oconto	10
Shawano	<u>275</u>
Total	960

<u>East Central Area</u>	
Outagamie	17
Marquette	250
Waushara	<u>1400</u>
Total	1,667

Questionable results were obtained where spray equipment was not available and roots were treated by dipping them in an insecticide solution. A test plot located in an area of heavy grub infestation in Marathon County was set up during the fall planting season to attempt to get information on the effectiveness of dipping.

INSECTS AND DISEASES REPORTED

Observations on pests from the five areas are summarized below. The pests are grouped by orders and are arranged alphabetically by scientific names within the orders. General terms are used to describe abundance and damage.

Pests which were reported but for which there is little additional information are grouped similarly and listed separately.

LEPIDOPTERA

LARGE ASPEN TORTRIX - Archips conflictana (Wlkr.)

Moderate to severe defoliation occurred in aspen stands in Oneida, Lincoln, Langlade, and Vilas Counties.

BIRCH SKELETONIZER - Buccatrix canadensisella (Cham)

Some premature discoloration and loss of leaves was observed in birch stands over the state but the insect appeared to be less prevalent than in 1956.

CHERRY SCALLOP SHELL MOTH - Calocalpe undulata (L)

Feeding conspicuous and widespread on wild cherry in Portage County. The insect was also reported from the Northeast Area.

SPRUCE BUDWORM - Choristoneura fumiferana (Clem.)

Some damage by the spruce budworm was reported in the Northeast Area on balsam and in localized areas in Chippewa and Douglas Counties (Northwest Area).

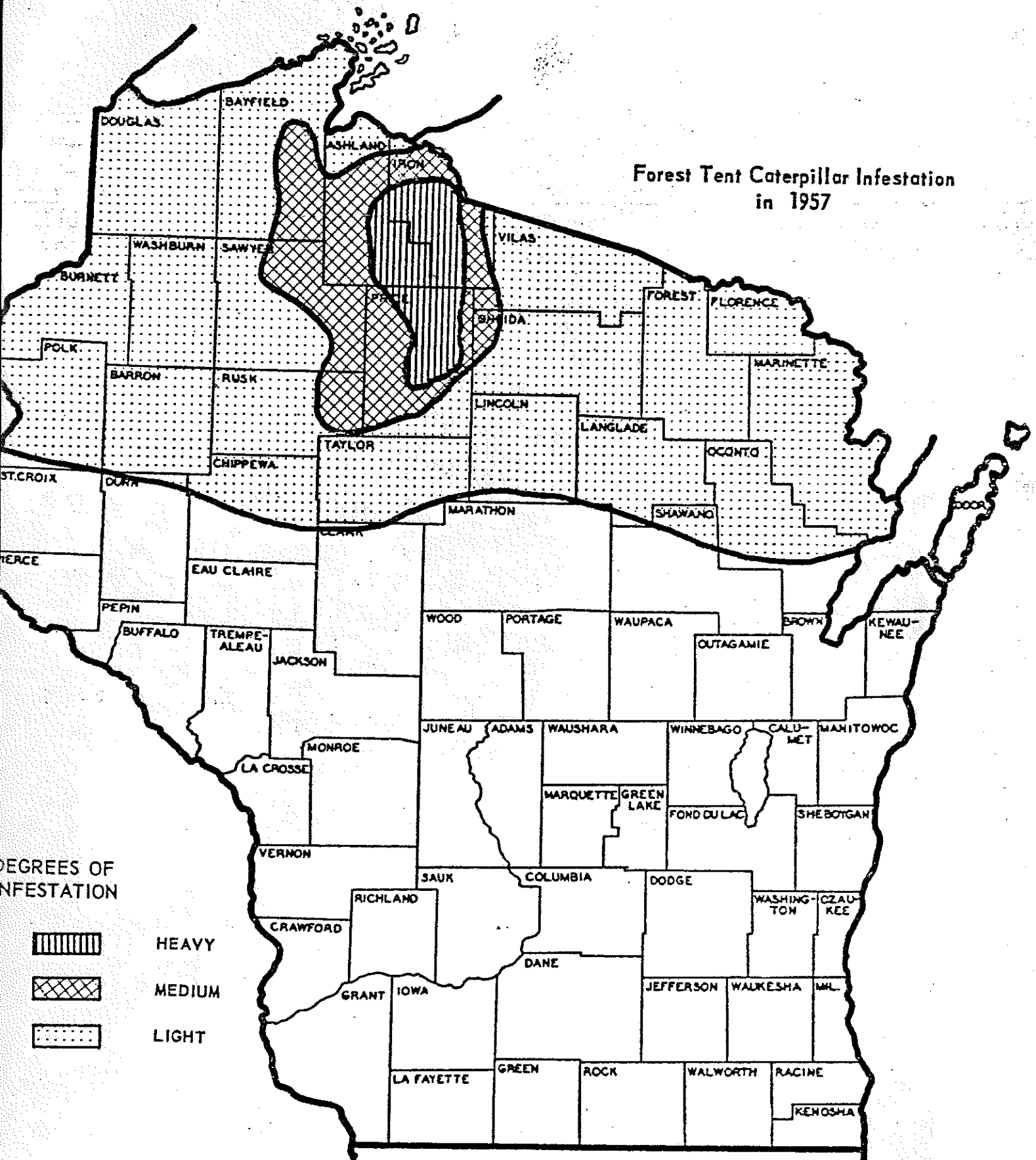
JACK-PINE BUDWORM - Choristoneura pinus (Freeman)

The heavy infestation of this insect collapsed rapidly during the spring of 1957 over much of the epidemic area reported in 1956. It was necessary to chemically control the jack pine budworm on approximately 19,000 acres of remaining heavy infestation in June. Defoliation of jack pine was generally light throughout the Northwest Area, and little or no tree mortality ensued.

An aerial spraying program was conducted in Oneida County northwest of Lake Nokomis in an area where more than 9,000 acres of jack pine had been extensively damaged during the three previous years while the budworm population was building up. Considerable tree mortality had occurred to both young and old trees before measures were undertaken to avoid further losses.

Other budworm infestations of lesser importance were in Vilas and Marinette Counties. In Vilas County approximately 2,000 acres of light infestation was reported. A 9,800 acre infestation in Marinette County collapsed in 1956, but an appreciable population continued to be active in this area, ranging from light to medium in intensity. Much of the affected and susceptible timber in this area was harvested during the year thus alleviating the condition.

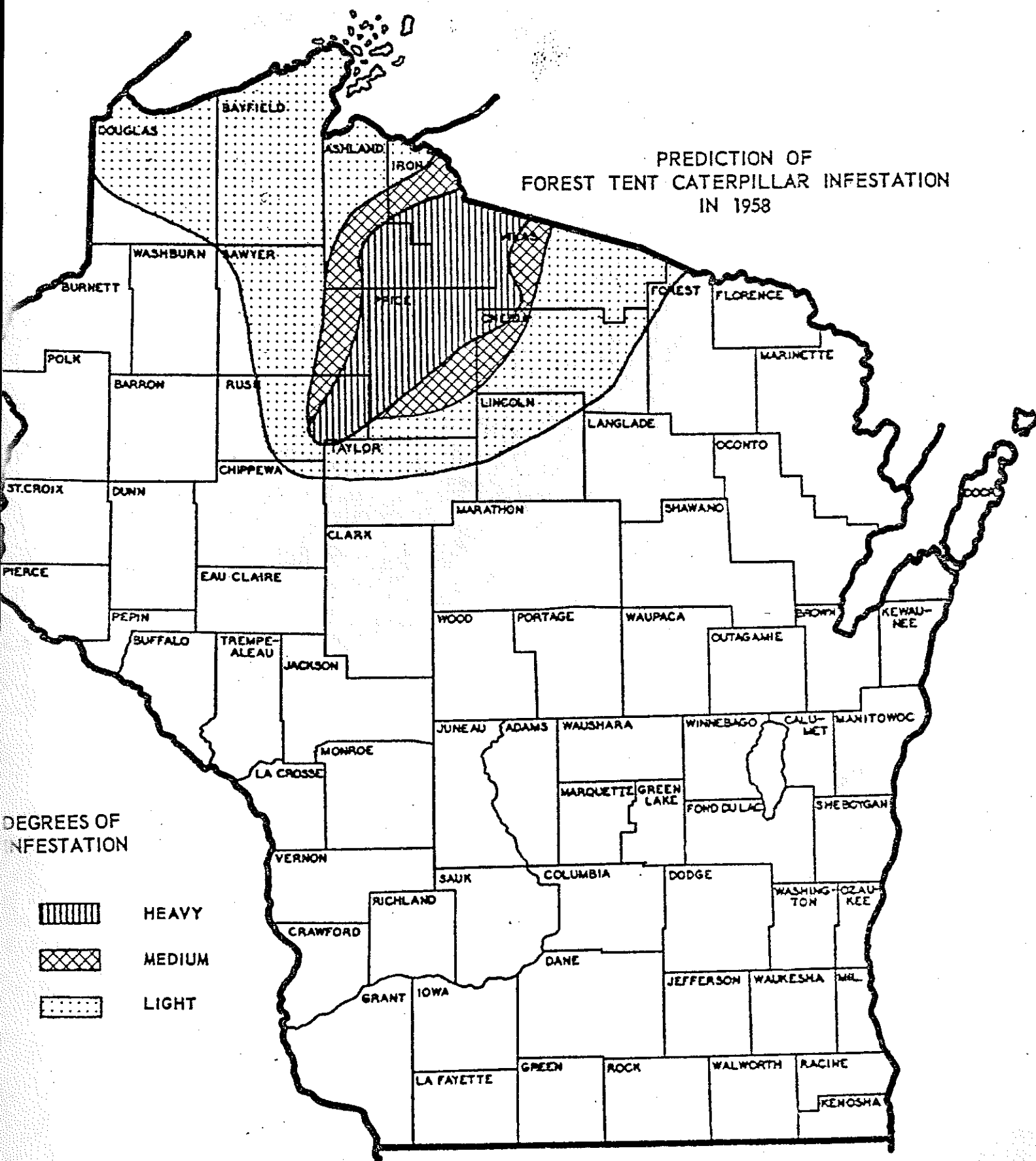
FOREST INSECT CONDITIONS
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AREAS AND DEGREES OF INFESTATIONS FOR 1957

FOREST INSECT CONDITIONS IN WISCONSIN 1957

PREDICTION OF FOREST TENT CATERPILLAR INFESTATION IN 1958



ANTICIPATED AREAS & DEGREES OF INFESTATION FOR 1958 BASED ON A WINTER EGG BAND SURVEY

LEPIDOPTERA (cont.)

Parasitism and other natural control factors contributed to the collapse of the infestation in the northwest. An egg survey in July indicated that few eggs were laid and little trouble is expected from this insect in 1958.

Surveillance is being continued in areas of previous infestation in order to quickly cope with any hazardous areas that might remain. Stands in West Central and Central Wisconsin where the population has remained endemic are also being watched.

LARCH CASEBEARER - *Coleophora laricella* (Hbn.)

The casebearer was present in most of the tamarack stands in the Northwest Area, but in endemic populations only.

There was some evidence of the insect's presence in the Northeast Area.

JACK PINE SHOOT BORER - *Eucosma sonomana* Kearf.

This insect which destroys the terminals of jack-pine is found in all natural jack pine areas in the state. Infestations averaging about 5% terminal destruction were noted in Sauk, Richland, Iowa and Columbia Counties.

Infestations were moderate but apparently increasing in Waupaca, Portage, Waushara, Marquette, and Green Lake Counties.

SADDLED PROMINENT - *Heterocampa guttivitta* (Wlkr.)

The infestation of saddled prominent in Door County is reduced in severity so that only relatively small areas of moderate infestation remain in the north end of the county and on Washington Island. A virus disease of the larvae and predation have largely been responsible for controlling this insect.

Moderate defoliation of maple stands in Shawano and Marathon Counties were also reported.

FOREST TENT CATERPILLAR - *Malacosoma disstria* (Hon.)

Based on defoliation surveys made in June from the air and on the ground and reports from observers, complete defoliation of some tracts was noted in Iron, western Vilas, and parts of Oneida and Langlade Counties. Partial defoliation of aspen was also reported in Forest and Lincoln Counties.

Defoliation of aspen was spotty in most of the Northwest Area, although there were tracts of complete defoliation in southeastern Sawyer County, eastern Rusk County and western Price County. Local tracts of complete defoliation were observed in Bayfield County also. It appears that the main center of the heavy infestation is shifting in a southeasterly direction leaving a few isolated units of noticeable defoliation within the epidemic areas of the previous years.

The number of cocoons parasitized by *Sarcophaga aldrichii* was heavy. The past year's defoliation map and next year's prediction map are on pages 13 and 14.

LEPIDOPTERA (cont.)

EUROPEAN PINE SHOOT MOTH - Rhyacionia buoliana (Schiff.)

The European pine shoot moth remains a serious problem and a threat to pine plantations along the Lake Michigan shore. It appears to have increased in abundance in heavily infested plantations in Point Beach State Park in Manitowoc County, in Terry Andrae State Park in Sheboygan County, and in other counties from Door County southward. Lateral movement of the shoot moth inland appears to be slow. This pest has been reported from a number of other counties in the southeastern part of the state including counties as far west as Dane and Winnebago. Many of these reports are of infestations on ornamentals.

Some nurseries have apparently been successful in cleaning up infestations by careful application of chemical sprays. Areas in which temperatures fall to -18°F . periodically when snow cover is sparse are not expected to be problem areas. In high hazard areas where infestations already occur and low temperatures are not likely to be a controlling factor it may be wise to curtail planting of susceptible pines until more practical control measures for plantations have been worked out.

MAPLE WEBWORM - Tetralopha sp.

Defoliation has been heavy for the past several years in maple stands in several northeastern counties. Maple in Florence County was severely defoliated in 1957, but infestations in other stands in the northeast area were lighter. Defoliation begins to show early in July and is most conspicuous in September before the leaves start changing color. The identity of the Tetralopha sp. is not known.

PINE WEBWORM - Tetrolopha robustella Zell.

Found commonly throughout the Northwest Area. Some jack pine plantations were heavily infested. No serious damage was noted.

High populations were observed in several Wisconsin River Valley plantings. Both jack and red pine were infested. No mortality was recorded although some plantations had trees less than a foot tall with 2 or 3 nests on them. The webworm was generally present in most young plantations observed in Columbia, Grant, Iowa and Sauk Counties. It was present also in the Central Wisconsin jack pine area and is apparently distributed all over the state in plantations on sandy soils.

LEAF ROLLERS

Light to moderate infestations occurred in Florence, Forest, Langlade and Oneida Counties. The infestations appeared to be causing little damage as the number of leaves affected on a tree was relatively small. More than one species of leaf roller appear to be present in the area including one or more in the genus Sparganothis and one or more Archips sp. A leaf roller of hardwoods, probably Archips argyrospila (Walker), was also reported in parts of Sawyer and Price Counties.

HYMENOPTERA

SAWFLY - *Diprion frutetorum* (F.)

A light infestation was found on red pine south of Greenbush in Sheboygan County. This is an initial report of this species in this area.

INTRODUCED PINE SAWFLY - *Diprion similis* (Htg.)

Serious defoliation of white pine occurred in parts of Sawyer, Polk, and Burnett Counties during 1957. Many large white pines were almost completely defoliated by this insect causing concern in some resort areas. Larvae were present until late October.

Cocoons collected late in the summer from various points in western counties were highly parasitized by *Monodontomerus dentipes* (Dalman).

BALSAM FIR SAWFLY - *Neodiprion abietis* (Harr.)

Attacks by this insect were reduced in severity in Door County, however, they were still heavy enough to reduce the merchantability of Christmas tree stock. The area of heaviest infestation was in the northeast corner of the Town of Bailey's Harbor where approximately 200 acres were sprayed by a Christmas tree producer.

Light populations on spruce and balsam fir were reported in Vilas, Oconto, Oneida, and Langlade Counties. The sawfly was sparse in the Northwest Area but was responsible for some light defoliation.

JACK PINE SAWFLY - *Neodiprion americanus banksianae* (Roh.)

A heavy infestation was reported on pole-sized jack pine in Lincoln County. Light infestations were reported in Vilas, Oneida and Langlade Counties.

RED-HEADED PINE SAWFLY - *Neodiprion lecontei* (Fitch)

Severe defoliation in many plantations of young Norway pine in Oneida, Marinette, and Oconto Counties required control with hand operated equipment.

In the Northwest Area this pest was found scattered throughout plantations and roadside plantings over most of the area, and also in some natural stands. However, no extensive damage was reported.

Scattered colonies were found in northern Brown County on red pine and on jack pine in Waushara, Portage, Waupaca, Marquette, and Green Lake Counties. Infestations were light but colonies were more numerous than during the previous year in this area.

Moderate damage was scattered in Sauk and Iowa County, jack pine plantations and windbreaks. Light to moderate infestations were general in the Southern Area. A second generation caused heavy damage to a few small jack pine plantations where early populations had also been heavy. Two plantations were sprayed in this area with hand operated equipment.

RED PINE SAWFLY - Neodiprion nanurus Schenk.

This pest was reported from widespread locations throughout the state. The heavy infestation of the past two years at the game farm in Columbia County appears to be subsiding. Light infestations were found in Dane County. Similar infestations were reported throughout the Northeast Area where it was found on red and jack pine. It was also reported on red pine in Barron and Douglas Counties in the northwest.

WHITE PINE SAWFLY - Neodiprion pinetum (Nort.)

Light infestations were found on state land near Two Rivers.

Severe defoliation occurred on a farm windbreak and nearby small plantation in Green County late in the season. The white pines were completely defoliated and the larvae continued feeding on red pines. Other reports of white pine sawfly defoliation came from Rock and Richland Counties. Single, scattered, defoliated trees were also observed in Columbia and Marquette Counties.

SAWFLY - Neodiprion virginianus complex

An unidentified sawfly almost completely defoliated a Buffalo County stand of jack pine planted in 1950. Both old and new foliage were eaten. Ninety-eight per cent of the trees were defoliated. Larvae had fed until the first frosts when some dead larvae were still found clinging to the twigs. Trees planted in 1953 had been fed on very little. This sawfly is a very destructive pest and may be more wide-spread than presently known.

LARCH SAWFLY - Pristiphora erichsonii (Htg.)

Aerial surveys in June and July showed most larch stands in the Northeast Area were defoliated to some extent and many were completely defoliated. This pest has increased in numbers in the Northwest Area to the point where practically all tamarack stands sustained moderate to complete defoliation. Some parasitism was evident but not sufficient to result in appreciable control of the insect.

Larch stands in the West Central, East Central and Southern Areas were not as severely attacked although stands in Door and Sheboygan Counties and a few other scattered stands were severely defoliated.

COLEOPTERA

ROOT COLLAR WEEVIL - Hylobius radialis Buch.

Many jack, red and Scotch pines in the sandier soils of the state ranging from the southern and central portions to the extreme northwest have been felled or are under attack by Hylobius radialis and many plantings are endangered. The identity of the weevil or weevils involved is not certain. Pales weevil may also be involved in the damage that is occurring and the role of fungi often associated with the felled or dying trees is not well known.

COLEOPTERA (cont.)

Burnett and Washburn Counties are heavily infested by this insect. Extensive plantation areas have been damaged and the future of many young jack pine plantations in the northwest appears questionable at this time.

Scotch pines are continually being eliminated by this insect in Marquette and Waushara Counties. Occasionally red pine is attacked. It does not yet appear to be as serious a problem in the Northeast Area as it is in other areas.

Severe damage was reported to Scotch, jack and red pine by the root collar weevil in Sauk and Iowa County plantations.

WHITE GRUBS - *Phyllophaga* sp.

White grubs were a serious problem in widely scattered tree planting sites throughout the state. They were responsible for heavy transplant losses, particularly in old-sod fields, where roots of seedlings were not chemically protected at planting time. Chemically treating seedling roots as they are planted has been practiced with good results in a number of fields and may eventually be a routine part of the planting operation where high populations of grubs are expected.

In the East Central Area infestations were somewhat lighter than last year except in parts of Portage, Waupaca, Waushara, and Marquette Counties where a slight increase occurred. Although infestations were generally lighter than last year, the insect is still abundant on open-grown white pine and Norway spruce. Attacks on red pine are rare in this area.

Damage by the weevil was very light in plantations of white pine and jack pine that were examined in the Southern Area. Many plantations had no current weevil damage and infestations in other stands averaged from 1% to 3%.

SMALLER EUROPEAN ELM BARK BEETLE - *Scolytus multistaius* (Marsh.)

The smaller European elm bark beetle the principal vector of Dutch elm disease has been found in the following 26 Wisconsin counties :

Columbia	Iowa	Richland	Winnebago
Crawford	Jefferson	Rock	Wood
Dane	Kenosha	Sauk	
Dodge	Kewaunee	Shawano	
Fond du Lac	Lafayette	Sheboygan	
Grant	Milwaukee	Walworth	
Green	Ozaukee	Washington	
Green Lake	Racine	Waukesha	

The native elm bark beetle, another vector, has been found in a number of counties from Walworth in the south to Kewaunee in the east, Ashland in the north, and Burnett in the Northwest.

COLEPOTERA (cont.)

SMALLER EUROPEAN ELM BARK BEETLE - (cont.)

Smaller European elm bark beetle larvae in infested logs were sealed in cages and exposed to winter temperatures in the coldest parts of the state where they survived temperatures as low as -33° F. in tests conducted by the Wisconsin Department of Agriculture. Peak emergence of the beetles occurs some time in June depending on weather conditions. In 1956 this peak was reached about June 20 and about 10 days later in 1957 according to data gathered by the Department of Agriculture.

HOMOPTERA

PINE SPITTLEBUG - *Aphrophora parallela* (Say.)

Large populations were reported on jack pine in localized areas throughout the northwest. A heavy infestation caused severe browning of Scotch pine in Waushara County.

Also Reported from Northeast Area

SARATOGA SPITTLEBUG - *Aphrophora saratogensis* (Fitch)

Adult spittlebug feeding in 1956 caused severe flagging in many young red pine plantings in Marinette, Florence, and Oconto Counties. Nymphal surveys conducted early in July of 1957 in the same plantings indicated high populations of spittlebug were present and additional damage could be expected. Nymphal counts in other parts of the state were generally lower and severe damage was not expected except in one plantation in Marathon County and one in Douglas County. An infestation was reported for the first time in Brown County just south of the Oconto-Brown County line. An aerial spray program was conducted late in July to control the pest in threatened plantations.

Although low nymphal populations were observed in most Northwest Area plantations the potential still remains high in the extensive red pine plantings, particularly in Douglas and Bayfield Counties.

PINE TORTOISE SCALE - *Toumeyella numismaticum* (P. & McD.)

Only light infestations were observed in natural jack pine in Oneida and Marinette Counties. No extensive damage was found in the Northwest Area but scattered infested jack pine was reported.

ORTHOPTERA

WALKING STICK - *Diapheromera femorata* (Sax)

ORTHOPTERA (cont.)

WALKING STICK (cont.)

At Rib Mountain State Park walking sticks were feeding heavily on oak, basswood, and white birch.

RED - LEGGED GRASSHOPPER - Melanoplus femur-rubrum (Deg.)

Relatively heavy feeding on oak on the western edge of Portage County and extending into Wood County was reported.

Although seldom a serious forest pest, grasshoppers are capable of being very destructive to seedlings. A fall planting of red pine in Columbia County was almost completely defoliated by this grasshopper within three weeks after planting. Other green vegetation was scarce in the 10 acre field and around it so the grasshoppers turned to the seedlings. The differential grasshopper was also present in the same field but in fewer numbers.

OTHER FOREST INSECTS REPORTED

Lepidoptera

Ugly nest caterpillar
Pine tube moth
Green-striped mapleworm
Walnut Caterpillar
Zimmeman pine moth
Fall webworm
Eastern tent caterpillar
Mourning cloak butterfly
Pitch-blister moth
Spruce needle miner
Pitch mass borer

Archips cerasivorana (Fitch)
Argyrotaenia pinatubana (Kearf.)
Anisota rubicunda (F.)
Datana integerrima G. & R.
Dioryctria zimmermani (Grote)
Hyphantria cunea (Drury)
Malacosoma americanum (F.)
Nymphalis antiopa (L.)
Petrova albicapitana (Busck)
Recurvaria piceaella (Kearf.)
Vespa mima pini (Kell.)

Hymenoptera

Pine false webworm
Elm sawfly
Dusky birch sawfly
Yellow-headed spruce sawfly

Acantholyda erythrocephala (L.)
Cimbex americana Leach
Croesus latitarsus (Nort.)
Pikonema alaskensis (Roh.)

Homoptera

Eastern spruce gall aphid
White-pine aphid
Elm cockscomb gall aphid
Pine bark aphid
Oystershell scale
Pine needle scale
Cottony maple scale

Chermes abietis (L.)
Cinara strobi (Fitch)
Colopha ulmicola (Fitch)
Lepidosaphes ulmi (L.)
Phenacaspis pinifoliae (Fitch)
Pineus strobi (Htg.)
Pulvinaria vitis (L.)

Coleoptera

Cottonwood leaf beetle
Willow flea weevil
Hickory bark beetle

Chrysomela scripta (F.)
Rhynchaenus rufipes (Lec.)
Scolytus quadrispinosus (Say)

Diptera

Balsam gall midge

Itonida balsamicola (Lint.)

Maple blight

A serious affliction of hard maple was encountered in Florence County during the past summer. Mortality to maple of all sizes was observed on approximately 10,000 acres of hardwood lands with a high percentage of maple. Other species such as elm, basswood, yellow birch apparently were unaffected. The mortality appeared to occur in pockets of varying size and trees continued to die through the summer. Approximately 750 M board feet of timber were marked for salvage by the Goodman Lumber Company.

In the spring, leaf rollers have been feeding on maple throughout the general area and webworms have caused defoliation later in the season. It is not known if there is any correlation between the activity of these insects and the mortality that is occurring. Everything possible is being done to determine the cause of the trouble and to alleviate the condition. (See section of this report on meetings and map on page 24).

Maple die back

A situation, very similar in many respects to the blight, occurs in Marathon County. Crown mortality was first noticed in hard maples near Wausau during 1954 in some farm woodlots. The known limits of the area where die-back is present have extended during the time it has been under observation. Young reproduction does not appear to be affected as it is in Florence County.

Oak blight

Large numbers of oak in Burnett and Washburn Counties have died during the past two summers. Symptoms appear very similar to those of oak wilt but the oak wilt organism has not been found in cultures made from affected trees. Trees from reproduction size to large saw timber have been killed, and red oaks appeared to be much more susceptible than white oaks.

Dutch Elm Disease

The Wisconsin Department of Agriculture, Dutch Elm Disease Laboratory reported 376 infected trees from 46 municipalities in 7 counties. Counties in which the disease is known to be present are: Jefferson, Kenosha, Milwaukee, Racine, Rock, Walworth, and Waukesha. This is in contrast to 63 cases reported from 14 communities in 6 counties in 1956. Jefferson was the only new county added in 1957.

Information on the Dutch Elm Disease Control Program is found in another section of this report.

Other diseases reported

White pine blister rust
Sweet Fern blister rust
Pine-oak gall rust
Shoestring root rot
Pine needle rust
White pine blight

Cronartium ribicola Fischer
Cronartium comptoniae Arth.
Cronartium cerebrum Hedge. and Long
Armillaria mellea (Vahl.) Quel.
Coleosporium solidaginis (Schw.) Thum.
Causal agent unknown

LEGEND



50 to 90% MORTALITY TO MAPLE



SMALL PATCHES OF DEAD TREES

STATE HIGHWAY COMMISSION
OF WISCONSIN
STATE OFFICE BUILDING, MADISON, WIS.

SCALE 0 1 2 MILES
ISSUED
1941

